

CLAIMS

It is claimed:

- 1           1.       A pair of semiconductor devices configured for a push-pull operation,  
2       comprising:  
3           a first device, comprising:  
4               a first n-doped region;  
5               a first p-doped region;  
6               a p-doped channel situated between said first n-doped and first p-doped  
7       regions, wherein a first depletion region exists within said channel when a reverse bias  
8       voltage is applied across said first n-doped and first p-doped regions; and  
9               a first photosensitive region comprising a relatively high p-doped region  
10       situated within said p-doped channel and partially including said first depletion region  
11       when said reverse bias voltage is applied across said first n-doped and first p-doped  
12       regions, wherein hole-electron pairs are generated from said partial first depletion  
13       region within said first photosensitive region in response to an incident light upon said  
14       first photosensitive region;  
15       a second device, comprising:  
16               a second p-doped region;  
17               a second n-doped region;  
18               an n-doped channel situated between said second n-doped and second p-  
19       doped regions, wherein a second depletion region exists within said n-doped channel  
20       when a reverse bias voltage is applied across said second n-doped and second p-doped  
21       regions; and

22 a second photosensitive region comprising a relatively high n-doped  
23 region situated within said n-doped channel and partially including said second  
24 depletion region when said reverse bias voltage is applied across said second n-doped  
25 and second p-doped regions, wherein hole-electron pairs are generated from said partial  
26 second depletion region within said second photosensitive region in response to said  
27 incident light upon said second photosensitive region;

28 a first impedance load connected to said first n-doped region for  
29 receiving a first bias voltage;

30 a second impedance load connected to said second p-doped region for  
31 receiving a third bias voltage; and

32 wherein said first p-doped region and said second n-doped region are  
33 coupled together to a third bias voltage, and wherein said first bias voltage is more  
34 positive than said third bias voltage, and further wherein said third bias voltage is more  
35 positive than said second positive voltage.

1 2. The pair of semiconductor devices of claim 1, wherein said third bias  
2 voltage is at ground potential.

1 3. The pair of semiconductor devices of claim 1, further including a fiber  
2 optic channel for applying an optical signal to said first and second photosensitive  
3 regions.

1 4. A pair of semiconductor devices configured for a push-pull operation,  
2 comprising:  
3 a first device, comprising:

4 a first n-doped region;  
5 a first p-doped region;  
6 a p-doped channel situated between said first n-doped and first p-doped  
7 regions, wherein a first depletion region exists within said channel when a reverse bias  
8 voltage is applied across said first n-doped and first p-doped regions; and  
9 a first photosensitive region comprising a relatively high p-doped region  
10 situated within said p-doped channel and partially including said first depletion region  
11 when said reverse bias voltage is applied across said first n-doped and first p-doped  
12 regions, wherein hole-electron pairs are generated from said partial first depletion  
13 region within said first photosensitive region in response to an incident light upon said  
14 first photosensitive region;  
15 a second device, comprising:  
16 a second p-doped region;  
17 a second n-doped region;  
18 an n-doped channel situated between said second n-doped and second p-  
19 doped regions, wherein a second depletion region exists within said n-doped channel  
20 when a reverse bias voltage is applied across said second n-doped and second p-doped  
21 regions; and  
22 a second photosensitive region comprising a relatively high n-doped  
23 region situated within said n-doped channel and partially including said second  
24 depletion region when said reverse bias voltage is applied across said second n-doped  
25 and second p-doped regions, wherein hole-electron pairs are generated from said partial  
26 second depletion region within said second photosensitive region in response to said  
27 incident light upon said second photosensitive region;

28                   a first impedance load connected to said first n-doped region at a first  
29   end thereof and to said second n-doped region at a second end thereof, wherein a first  
30   bias voltage is to be applied to said second end of said first impedance load; and  
31                   a second impedance load connected to said first p-doped region at a first  
32   end thereof and to said second p-doped region at said second end thereof, wherein a  
33   second bias voltage is to be applied to said second end of said second impedance load,  
34   wherein said first bias voltage is more positive than said second bias voltage.

1               5.     The pair of semiconductor devices of claim 4, wherein said second bias  
2   voltage is at ground potential.

1               6.     The pair of semiconductor devices of claim 4, further including a fiber  
2   optic channel for applying an optical signal to said first and second photosensitive  
3   regions.

1               7.     A semiconductor device configured for a push-pull operation,  
2   comprising:  
3               a p-doped region;  
4               an n-doped region;  
5               an n-doped channel situated between said second n-doped and second p-  
6   doped regions, wherein a second depletion region exists within said n-doped channel  
7   when a reverse bias voltage is applied across said second n-doped and second p-doped  
8   regions; and  
9               a second photosensitive region comprising a relatively high n-doped  
10   region situated within said n-doped channel and partially including said second

11 depletion region when said reverse bias voltage is applied across said second n-doped  
 12 and second p-doped regions, wherein hole-electron pairs are generated from said partial  
 13 second depletion region within said second photosensitive region in response to said  
 14 incident light upon said second photosensitive region;  
 15 a first load impedance having a first end coupled to said n-doped region,  
 16 and a second end for receiving a first bias voltage;  
 17 a second load impedance having a first end coupled to said p-doped  
 18 region, and a second end for receiving a second bias voltage, wherein said first bias  
 19 voltage is more positive than said second bias voltage.

1 8. The semiconductor device of claim 7, wherein said second bias voltage  
 2 is at ground potential.

1 9. The semiconductor device of claim 7, further including a fiber optic  
 2 channel for applying an optical signal to said first photosensitive region.

1 10. A semiconductor device configured for a push-pull operation,  
 2 comprising:  
 3 an n-doped region;  
 4 a p-doped region;  
 5 a p-doped channel situated between said first n-doped and first p-doped  
 6 regions, wherein a first depletion region exists within said channel when a reverse bias  
 7 voltage is applied across said first n-doped and first p-doped regions; and  
 8 a first photosensitive region comprising a relatively high p-doped region  
 9 situated within said p-doped channel and partially including said first depletion region

10 when said reverse bias voltage is applied across said first n-doped and first p-doped  
11 regions, wherein hole-electron pairs are generated from said partial first depletion  
12 region within said first photosensitive region in response to an incident light upon said  
13 first photosensitive region;  
14 a first load impedance having a first end coupled to said n-doped region,  
15 and a second end for receiving a first bias voltage;  
16 a second load impedance having a first end coupled to said p-doped  
17 region, and a second end for receiving a second bias voltage, wherein said first bias  
18 voltage is more positive than said second bias voltage.

1 11. The semiconductor device of claim 10, wherein said second bias voltage  
2 is at ground potential.

1 12. The semiconductor device of claim 10, further including a fiber optic  
2 channel for applying an optical signal to said first photosensitive region.